Dell™ PowerEdge™ 2400 Systems

# RACK INSTALLATION GUIDE

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## *Notes, Notices, Cautions, and Warnings*

Throughout this guide, blocks of text may be accompanied by an icon and printed in bold type or in italic type. These blocks are notes, notices, cautions, and warnings, and they are used as follows:

*NOTE: A NOTE indicates important information that helps you make better use of your computer system.*

**NOTICE: A NOTICE indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.**

**CAUTION: A CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.**

**WARNING: A WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious bodily injury.**

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# Safety Instructions

Use the following safety guidelines to ensure your own personal safety and to help protect your server, storage system, or appliance from potential damage.

## Notes, Notices, Cautions, and Warnings

Throughout this guide, blocks of text may be accompanied by an icon and printed in bold type or in italic type. These blocks are notes, notices, cautions, and warnings, and they are used as follows:

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**WARNING: A WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious bodily injury.**

## Safety Caution and Warnings

Observe the following caution and warnings while servicing this system:

**CAUTION: There is a danger of a new battery exploding if it is incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.**

# Additional Safety Precautions

To reduce the risk of bodily injury, electrical shock, fire, and damage to the equipment, observe the following precautions.

## General Precautions

Observe the following general precautions for using and working with your system:

- Observe and follow service markings. Do not service any Dell product except as explained in your Dell system documentation. Opening or removing covers that are marked with the triangular symbol with a lightning bolt may expose you to electrical shock. Components inside these compartments should be serviced only by a Dell authorized service technician.
- If any of the following conditions occur, unplug the product from the electrical outlet and replace the part or contact your Dell authorized service provider:
  - The power cable, extension cable, or plug is damaged.
  - An object has fallen into the product.
  - The product has been exposed to water.
  - The product has been dropped or damaged.
  - The product does not operate correctly when you follow the operating instructions.
- Keep your system components away from radiators and heat sources. Also, do not block cooling vents.
- Do not spill food or liquids on your system components, and never operate the product in a wet environment. If the computer gets wet, see the appropriate chapter in your troubleshooting guide or contact a Dell-authorized service provider.
- Do not push any objects into the openings of your system components. Doing so can cause fire or electric shock by shorting out interior components.
- Use the product only with Dell products or other Dell-approved equipment.
- Allow the product to cool before removing covers or touching internal components.
- Use the correct external power source. Operate the product only from the type of power source indicated on the electrical ratings label. If you are not sure of the type of power source required, consult your Dell service provider or local power company.

- To help avoid damaging your system components, be sure the voltage selection switch (if provided) on the power supply is set to match the power available at your location:
  - 115 volts (V)/60 hertz (Hz) in most of North and South America and some Far Eastern countries such as South Korea and Taiwan
  - 100 V/50 Hz in eastern Japan and 100 V/60 Hz in western Japan
  - 230 V/50 Hz in most of Europe, the Middle East, and the Far East

  Also be sure that your monitor and attached devices are electrically rated to operate with the power available in your location.
- Use only approved power cable(s). If you have not been provided with a power cable for your server, storage system, or appliance, or for any AC-powered option intended for your system, purchase a power cable that is approved for use in your country. The power cable must be rated for the product and for the voltage and current marked on the product's electrical ratings label. The voltage and current rating of the cable should be greater than the ratings marked on the product.
- To help prevent electric shock, plug the system/components and peripheral power cables into properly grounded electrical outlets. These cables are equipped with three-prong plugs to help ensure proper grounding. Do not use adapter plugs or remove the grounding prong from a cable. If you must use an extension cable, use a three-wire cable with properly grounded plugs.
- Observe extension cable and power strip ratings. Make sure that the total ampere rating of all products plugged into the extension cable or power strip does not exceed 80 percent of the extension cable or power strip ampere ratings limit.
- To help protect your system/components from sudden, transient increases and decreases in electrical power, use a surge suppressor, line conditioner, or un-interruptible power supply (UPS).
- Position system cables and power cables carefully; route system cables and the power cable and plug so that they cannot be stepped on or tripped over. Be sure that nothing rests on your system components' cables or power cable.
- Do not modify power cables or plugs. Consult a licensed electrician or your power company for site modifications. Always follow your local/national wiring rules.
- To help avoid possible damage to the system board, wait 5 seconds after turning off the system before removing a component from the system board or disconnecting a peripheral device from the computer.
- Handle batteries carefully. Do not disassemble, crush, puncture, short external contacts, dispose of in fire or water, or expose batteries to temperatures higher than 60 degrees Celsius (140 degrees Fahrenheit). Do not attempt to open or service batteries; replace batteries only with batteries designated for the product.
- Turn down the volume before using headphones or other audio devices.

## *Precautions for Servers, Storage Systems, and Appliances*

Observe the following additional safety guidelines for your system:

- Unless your installation and/or troubleshooting documentation specifically allows it, do not remove enclosure covers, attempt to override the safety interlocks, or access any components inside the system. Depending on your system, installation and repairs may be done only by individuals who are qualified to service your computer or storage system equipment and trained to deal with products capable of producing hazardous energy levels.
- When connecting or disconnecting power to hot-pluggable power supplies, if offered with your Dell product, observe the following guidelines:
  - — Install the power supply before connecting the power cable to the power supply.
  - — Unplug the power cable before removing the power supply.
  - — If the system has multiple sources of power, disconnect power from the system by unplugging *all* power cables from the power supplies.
- Move products with care; ensure that all casters and/or stabilizers are firmly connected to the computer or storage system. Avoid sudden stops and uneven surfaces.

## *Precautions for Rack-Mountable Products*

Observe the following precautions for rack stability and safety. Also refer to the rack installation documentation accompanying the system and the rack for specific warning and/or caution statements and procedures.

Servers, storage systems, and appliances are considered to be components in a rack. Thus, "component" refers to any server, storage system, or appliance, as well as to various peripherals or supporting hardware.

**WARNING: Installing Dell system components in a Dell rack without the front and side stabilizers installed could cause the rack to tip over, potentially resulting in bodily injury under certain circumstances. Therefore, always install the stabilizers before installing components in the rack.**

**After installing system/components in a rack, never pull more than one component out of the rack on its slide assemblies at one time. The weight of more than one extended component could cause the rack to tip over and injure someone.**

*NOTE: Dell's servers, storage systems, and appliances are certified as components for use in Dell's rack cabinet using the Dell customer rack kit. The final installation of Dell systems and rack kits in any other brand of rack cabinet has not been approved by any safety agencies. It is the customer's responsibility to have the final combination of Dell systems and rack kits for use in other brands of rack cabinets evaluated for suitability by a certified safety agency.*

- System rack kits are intended to be installed in a Dell rack by trained service technicians. If you install the kit in any other rack, be sure that the rack meets the specifications of a Dell rack.
- Do not move large racks by yourself. Due to the height and weight of the rack, Dell recommends a minimum of two people to accomplish this task.
- Before working on the rack, make sure that the stabilizers are secure to the rack, extend to the floor, and that the full weight of the rack rests on the floor. Install front and side stabilizers on a single rack or front stabilizers for joined multiple racks before working on the rack.
- Always load the rack from the bottom up, and load the heaviest item in the rack first.
- Make sure that the rack is level and stable before extending a component from the rack.
- Use caution when pressing the component rail release latches and sliding a component into or out of a rack; the slide rails can pinch your fingers.
- After a component is inserted into the rack, carefully extend the rail into a locking position, and then slide the component into the rack.
- Do not overload the AC supply branch circuit that provides power to the rack. The total rack load should not exceed 80 percent of the branch circuit rating.
- Ensure that proper airflow is provided to components in the rack.
- Do not step on or stand on any system/component when servicing other systems/components in a rack.

## *Precautions for Products With Modems, Telecommunications, or Local Area Network Options*

Observe the following guidelines when working with options:

- Do not connect or use a modem or telephone during a lightning storm. There may be a risk of electrical shock from lightning.
- Never connect or use a modem or telephone in a wet environment.
- Do not plug a modem or telephone cable into the network interface controller (NIC) receptacle.
- Disconnect the modem cable before opening a product enclosure, touching or installing internal components, or touching an uninsulated modem cable or jack.
- Do not use a telephone line to report a gas leak while you are in the vicinity of the leak.

## *Precautions for Products With Laser Devices*

Observe the following precautions for laser devices:

- Do not open any panels, operate controls, make adjustments, or perform procedures on a laser device other than those specified in the product's documentation.
- Only authorized service technicians should repair laser devices.

# *When Working Inside Your Computer*

Before you remove the computer covers, perform the following steps in the sequence indicated.

**CAUTION: Some Dell systems can be serviced only by trained service technicians because of high voltages and energy hazards. Do not attempt to service the computer system yourself, except as explained in this guide and elsewhere in Dell documentation. Always follow installation and service instructions closely.**

**NOTICE: To help avoid possible damage to the system board, wait 5 seconds after turning off the system before removing a component from the system board or disconnecting a peripheral device from the computer.**

1. Turn off your computer and any devices.
2. Ground yourself by touching an unpainted metal surface on the chassis, such as the metal around the card-slot openings at the back of the computer, before touching anything inside your computer.

   While you work, periodically touch an unpainted metal surface on the computer chassis to dissipate any static electricity that might harm internal components.
3. Disconnect your computer and devices from their power sources. Also, disconnect any telephone or telecommunication lines from the computer.

   Doing so reduces the potential for personal injury or shock.

In addition, take note of these safety guidelines when appropriate:

- When you disconnect a cable, pull on its connector or on its strain-relief loop, not on the cable itself. Some cables have a connector with locking tabs; if you are disconnecting this type of cable, press in on the locking tabs before disconnecting the cable. As you pull connectors apart, keep them evenly aligned to avoid bending any connector pins. Also, before you connect a cable, make sure that both connectors are correctly oriented and aligned.
- Handle components and cards with care. Don't touch the components or contacts on a card. Hold a card by its edges or by its metal mounting bracket. Hold a component such as a microprocessor chip by its edges, not by its pins.

**CAUTION: There is a danger of a new battery exploding if it is incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.**

# Protecting Against Electrostatic Discharge

Static electricity can harm delicate components inside your computer. To prevent static damage, discharge static electricity from your body before you touch any of your computer's electronic components, such as the microprocessor. You can do so by touching an unpainted metal surface on the computer chassis.

As you continue to work inside the computer, periodically touch an unpainted metal surface to remove any static charge your body may have accumulated.

You can also take the following steps to prevent damage from electrostatic discharge (ESD):

- When unpacking a static-sensitive component from its shipping carton, do not remove the component from the antistatic packing material until you are ready to install the component in your computer. Just before unwrapping the antistatic packaging, be sure to discharge static electricity from your body.
- When transporting a sensitive component, first place it in an antistatic container or packaging.
- Handle all sensitive components in a static-safe area. If possible, use antistatic floor pads and workbench pads.

The following notice may appear throughout this document to remind you of these precautions:

**NOTICE: See "Protecting Against Electrostatic Discharge" in the safety instructions at the front of this guide.**

# Ergonomic Computing Habits

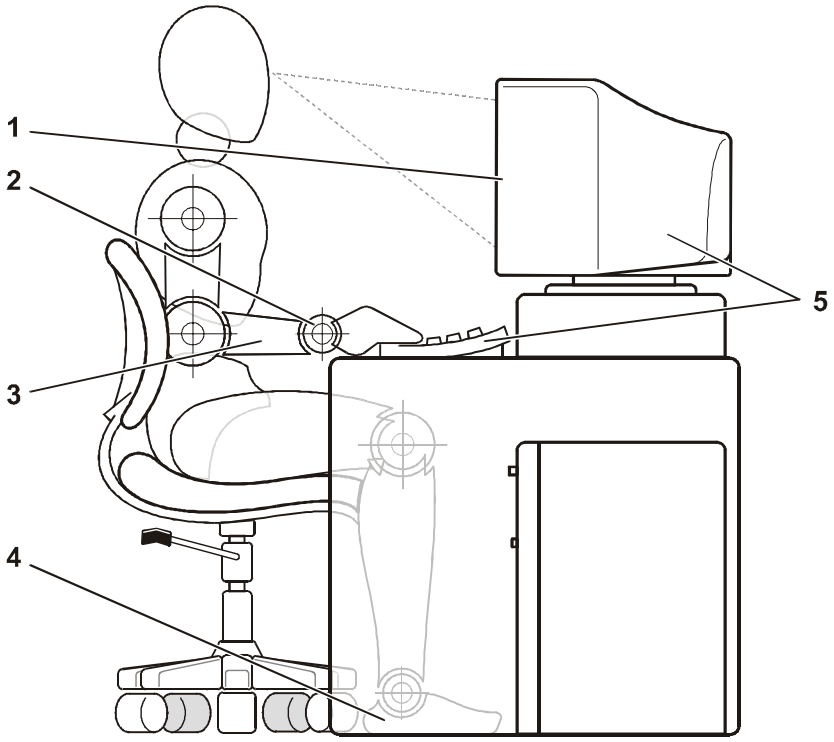
**CAUTION: Improper or prolonged keyboard use may result in injury.**

**CAUTION: Viewing the monitor screen for extended periods of time may result in eye strain.**

For comfort and efficiency, observe the following ergonomic guidelines when you set up and use your computer system:

- Position your system so that the monitor and keyboard are directly in front of you as you work. Special shelves are available (from Dell and other sources) to help you correctly position your keyboard.
- Set the monitor at a comfortable viewing distance (usually 510 to 610 millimeters [20 to 24 inches] from your eyes).
- Make sure that the monitor screen is at eye level or slightly lower when you sit in front of the monitor.
- Adjust the tilt of the monitor, its contrast and brightness settings, and the lighting around you (such as overhead lights, desk lamps, and the curtains or blinds on nearby windows) to minimize reflections and glare on the monitor screen.

- Use a chair that provides good lower back support.
- Keep your forearms horizontal with your wrists in a neutral, comfortable position while you use the keyboard or mouse.
- Always leave space to rest your hands while you use the keyboard or mouse.
- Let your upper arms hang naturally at your sides.
- Sit erect, with your feet resting on the floor and your thighs level.
- When sitting, make sure the weight of your legs is on your feet and not on the front of your chair seat. Adjust your chair's height or use a footrest, if necessary, to maintain proper posture.
- Vary your work activities. Try to organize your work so that you do not have to type for extended periods of time. When you stop typing, try to do things that use both hands.




| | |
|---|---|
| **1** | Monitor screen at or below eye level |
| **2** | Wrists relaxed and flat |
| **3** | Arms at desk level |
| **4** | Feet flat on the floor |
| **5** | Monitor and keyboard positioned directly in front of user |

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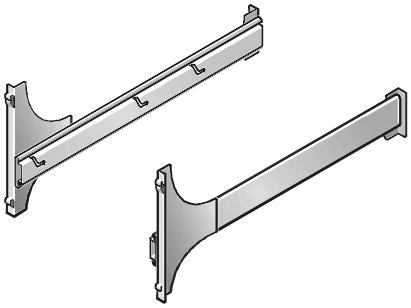
# *Dell™ PowerEdge™ 2400 Systems Rack Installation Guide*

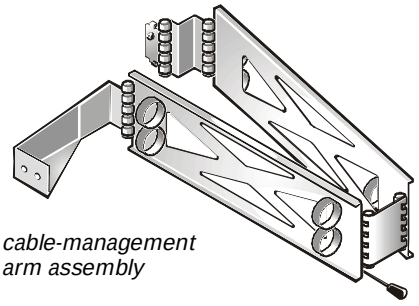
This installation guide provides instructions for trained service technicians installing one or more Dell PowerEdge 2400 computer systems in a Dell rack. One rack kit is required for each PowerEdge system to be installed in the rack. The rack kit includes the following items (see Figure 1-1):

- One pair of slide assemblies with mounting brackets*
- One rack adapter*
- One cable-management arm assembly
- One computer top cover assembly including shoulder screws and rack adapter*
- Four 8-32 x 0.313-inch pan-head Phillips-head screws*
- One 10-32 x 0.5-inch pan-head Phillips-head screw*
- Three shoulder screws*

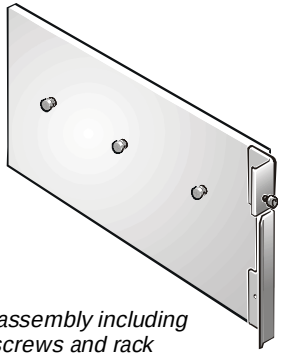
* *If you purchased a Dell rack with your PowerEdge system, some of the hardware may be preinstalled in the rack.*



slide assemblies (1 pair)
with mounting brackets*



cable-management
arm assembly



top cover assembly including
shoulder screws and rack
adapter *

rack adapter (1)

10-32 x 0.5-inch
screws (1)

8-32 x 0.313-
inch screws (4)
*2 screws may
be installed

shoulder screws (3)

* If you purchased a Dell rack with your PowerEdge system, some of the hardware may be preinstalled in the rack.

***Figure 1-1. Rack Kit Contents***

# Before You Begin

Before you begin installing your PowerEdge system in the rack, carefully read "Safety Instructions" found earlier in this guide.

## Recommended Tools

To install the rack kit, you need the following tools:

- Installation template
- A #2 Phillips-head screwdriver
- A flat-blade screwdriver
- Masking tape or felt-tip pen

# Installing the Rack Kit

*NOTES: If you purchased a Dell rack along with your PowerEdge system, the slide assemblies may be preinstalled in the rack.*

*For instructions on installing the PowerEdge system itself, see "Installing the PowerEdge System in the Rack" found later in this guide.*

To install the slide assemblies in the rack, perform the following steps:

1. Remove the rack's front and back doors.
2. Install the slide assemblies in the rack.

The subsections that follow include instructions for performing these tasks.

## Removing the Doors From a 24-U or 42-U Rack

You must remove the doors from the rack to provide access to the interior of the rack and to prevent damage to the doors while installing the kit. To remove the doors, perform the following steps.

**CAUTION: To prevent personal injury due to the size and weight of the doors, never attempt to remove the doors by yourself.**

1. Open the latch on the front door. If you have a 24-U (1 U=1.75-inches) rack cabinet, unlock and twist the handle clockwise and open the door (see Figure 1-2).

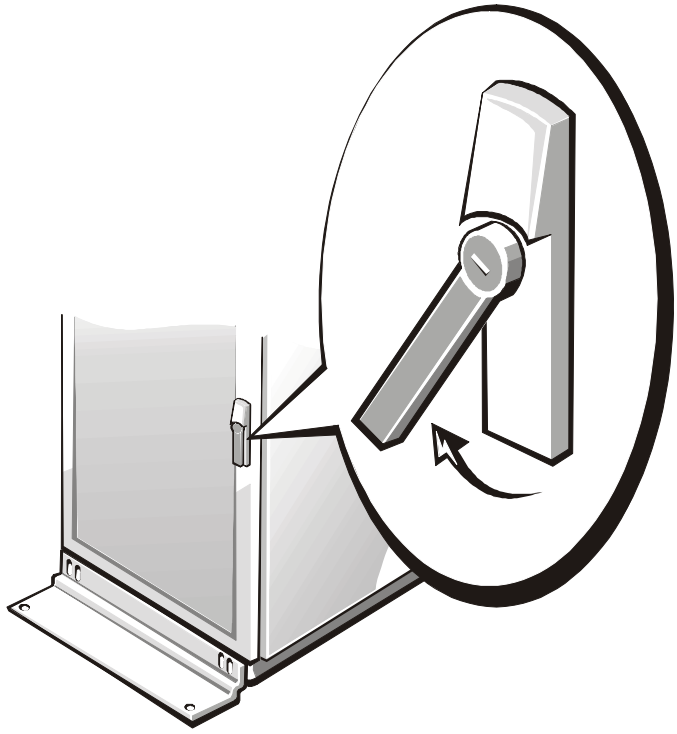


***Figure 1-2. Opening the Latch on the 24-U Rack Door***

If you have a 42-U rack cabinet, slide the latch's push-button cover up as far as it will go, press the push button, rotate the handle clockwise until the latch releases, and then pull the door open (see Figure 1-3).

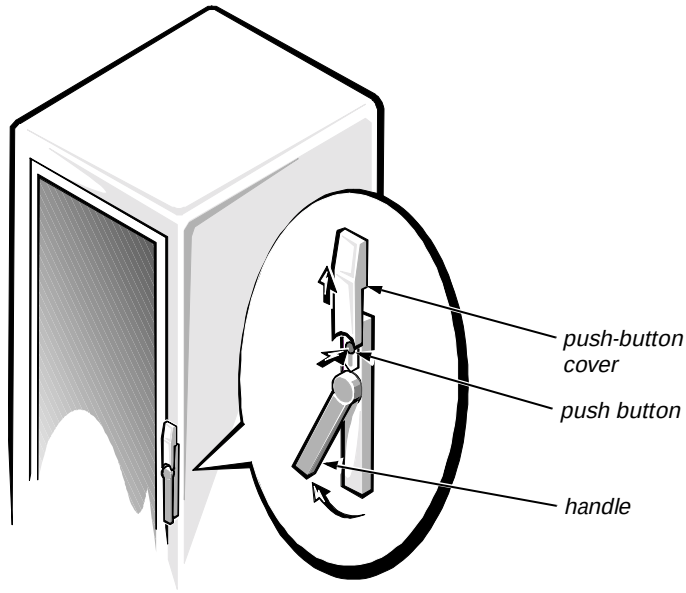



***Figure 1-3. Opening the Latch on the 42-U Rack Door***

2. Remove the front door of the rack.

   If you have a 42-unit rack, perform the following steps (see Figure 1-4):

   a. One person should grasp the top of the door to stabilize it. The other person should grasp the bottom of the door.

   b. The person holding the bottom of the door should press the release lever on the bottom hinge and then pull the bottom of the door away from the rack a few inches.

   c. The person holding the top of the door should press the release lever on the top hinge and then pull the door away from the rack.

   If you have a 24-U rack, perform the following steps (see Figure 1-5):

   a. With the door open, lift out and fully retract all hinge pins.

   b. Lift the door out carefully.

Repeat steps 1 and 2 to remove the back door from the rack.

Store the doors in an area where they will not fall over while you install the kit.

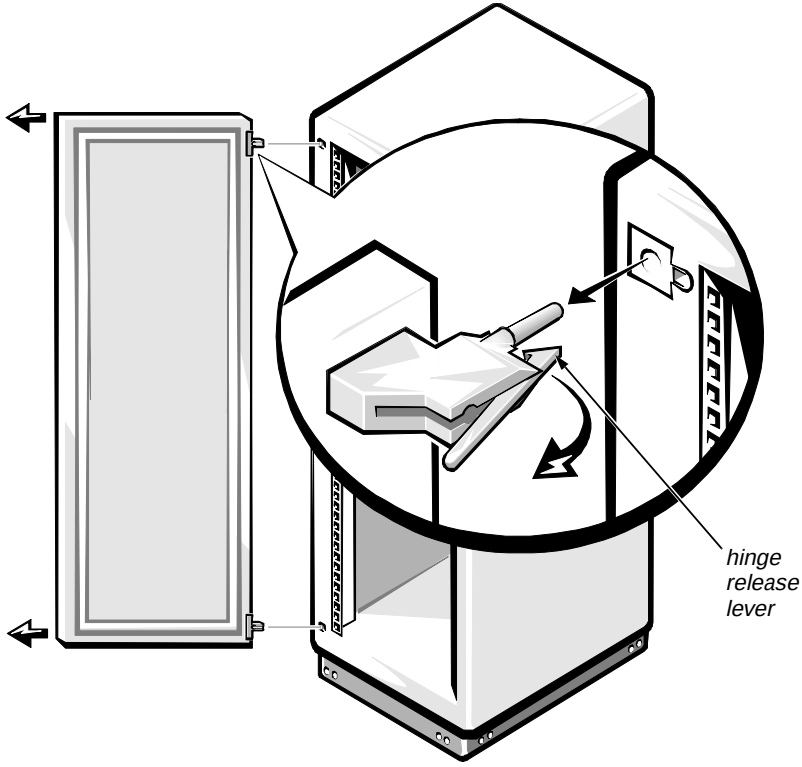



***Figure 1-4. Removing the 42-U Rack Doors***

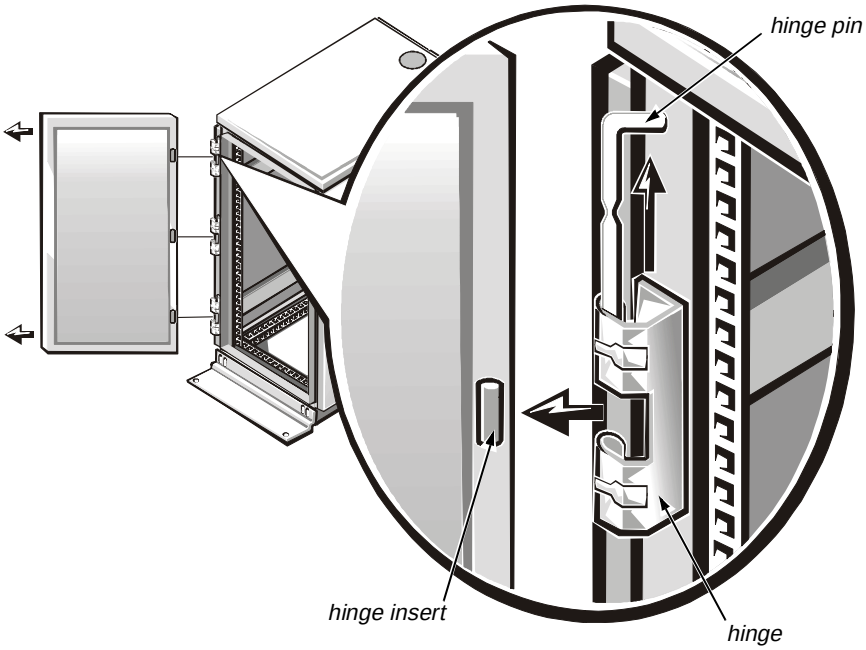



***Figure 1-5. Removing the 24-U Rack Doors***

## *Installing the Slide Assemblies in the Rack*

*NOTE: If the slide assemblies were preinstalled by Dell, you may skip this section.*

You must allow 6 U (10.5 inches) of vertical space for each PowerEdge 2400 system you install in the rack.

*NOTE: The rails of the rack are marked by small indentations in 1-U increments (see Figure 1-6).*

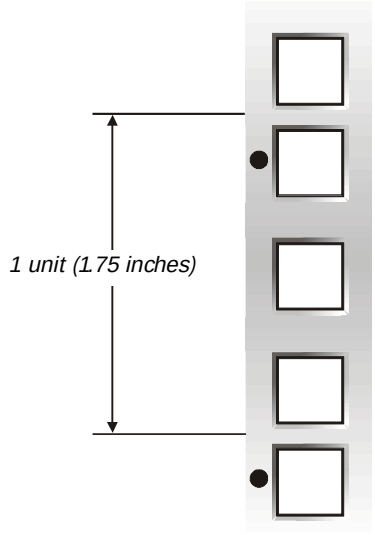



***Figure 1-6. One Rack Unit***

For more information, see the Dell Rack Advisor software available on the Dell Web site at **http://www.dell.com**.

**WARNING: If you are installing more than one computer, install the slide assemblies so that the first computer is installed in the lowest available position in the rack.**

To install the slide assemblies in the rack, perform the following steps:

1. Place the front of the template over the front of the front rack rails (see Figure 1-7).

   Position the bottom of the template in line with the desired bottom position of the computer chassis.

2. Mark the upper- and lower-mounting positions for the slide brackets.

3. Turn over the template and place the back of the template over the front side of the back rack rails in the same position as you placed it on the front rack rail.

4. Mark the upper- and lower-mounting positions for the slide brackets as shown on the template.

After determining where to install the PowerEdge system, mark the rack's front and back vertical rails with a felt-tip marker or masking tape where the system's lower edge will be located.

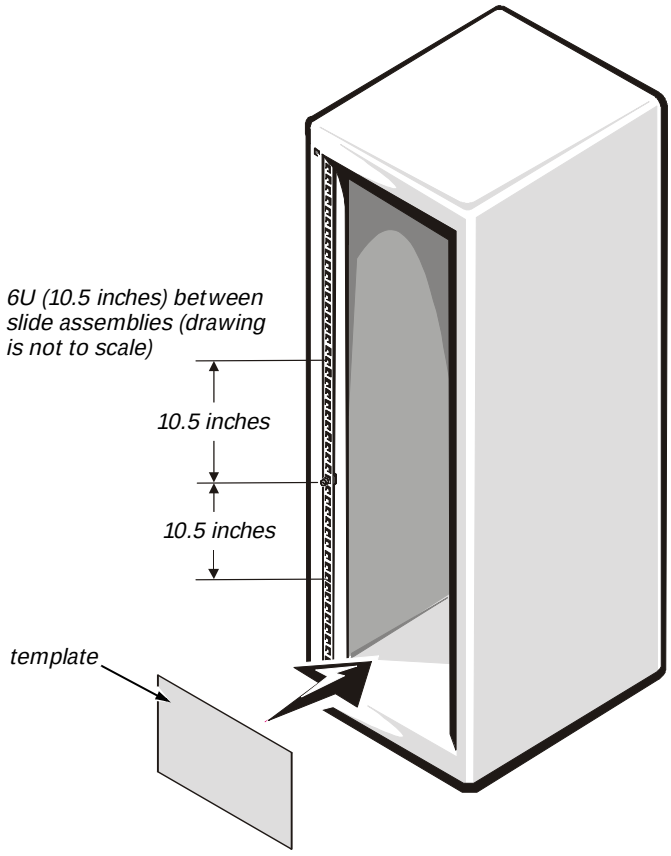



***Figure 1-7. Determining Where to Install the Slide Assemblies***

5. Align the mounting tab on the front of the slide-assembly mounting bracket with the notches in the rack (see Figure 1-8).
6. Push until the mounting tabs are secure in the notches on the rack and the pushbutton clicks out.
7. Push back on the slide assembly until the mounting tabs lock into the back side of the rack.
8. Repeat steps 5 through 7 for the other side of the rack.

   Ensure that the rails are mounted at the same position on each side of the rack.

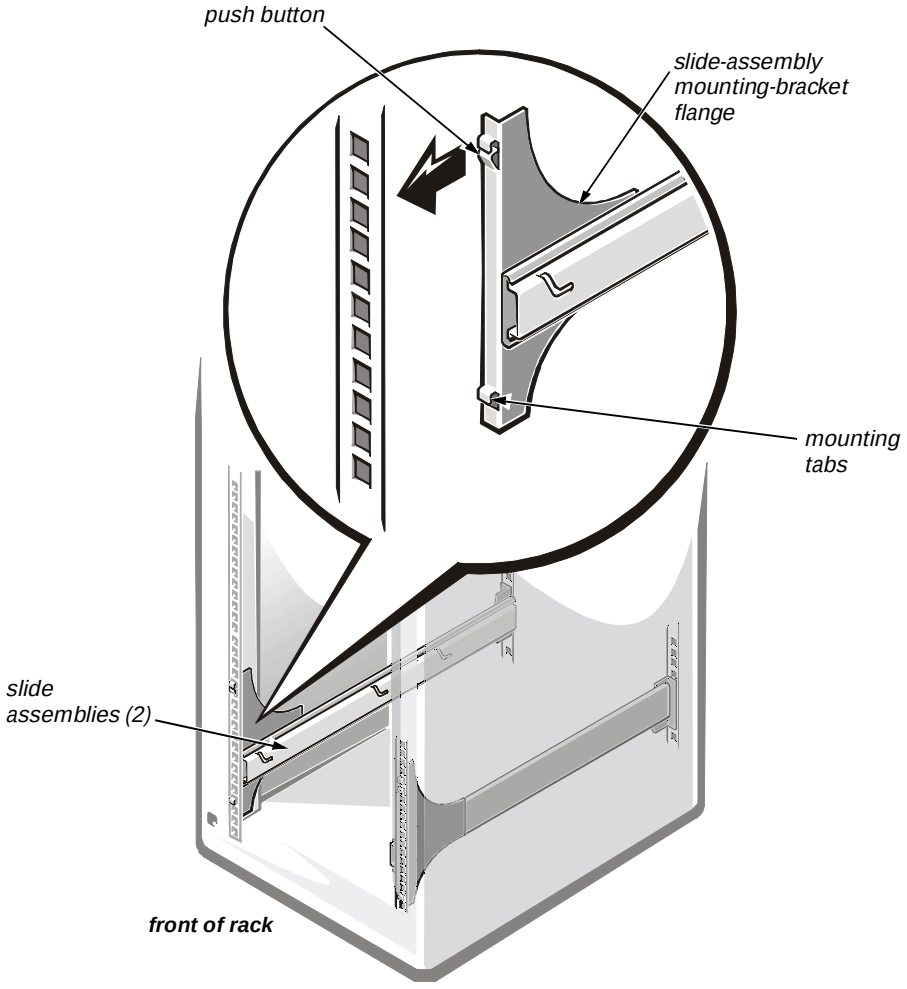



***Figure 1-8. Installing the Slide Assemblies***

# Installing the PowerEdge System in the Rack

The subsections that follow include instructions for installing the PowerEdge system.

## Installing the Rack Adapters

To install the rack adapters on the computer, perform the following steps.

The following procedure is required only if you are converting a PowerEdge 2400 system from a tower chassis to a rack-ready chassis.

**CAUTION: The computer may weigh up to 32 kg (70 lb) when fully loaded. To prevent personal injury, do not attempt to move the computer by yourself.**

1. Lay the computer on its top side (see Figure 1-9) on a piece of foam or cardboard (to prevent damage to the computer while you remove the feet).

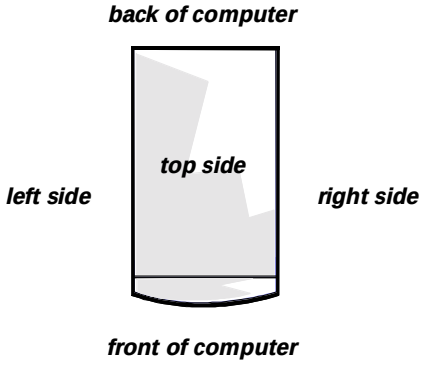



***Figure 1-9. Computer Orientation***

2. Use a small flat-blade screwdriver to remove the plastic screw from each of the four rubber feet on the bottom of the chassis (see Figure 1-10).

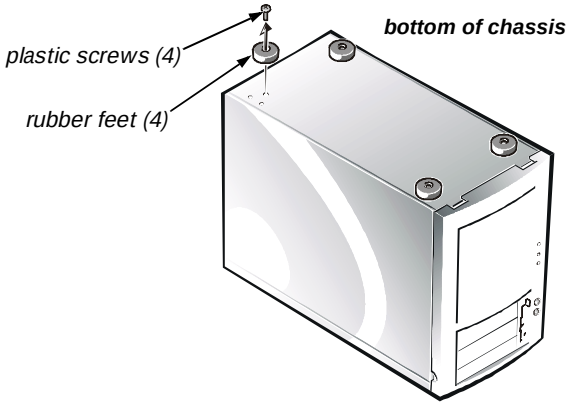



***Figure 1-10. Removing the Feet***

3. From the outside of the chassis, pry each foot from the chassis.
4. Turn the computer over and lay it on the bottom side.
5. Remove the front bezel and the left- and right-side computer covers.

   See Chapter 7, "Checking Inside the Computer", in the computer's *Installation and Troubleshooting Guide* for instructions on removing the bezel and computer covers.
6. Remove the two screws at the front edge of the top cover (see Figure 1-11). (Retain the screws for later use.)
7. Slide the top cover about one-half of an inch toward the front of the computer, and lift it away.

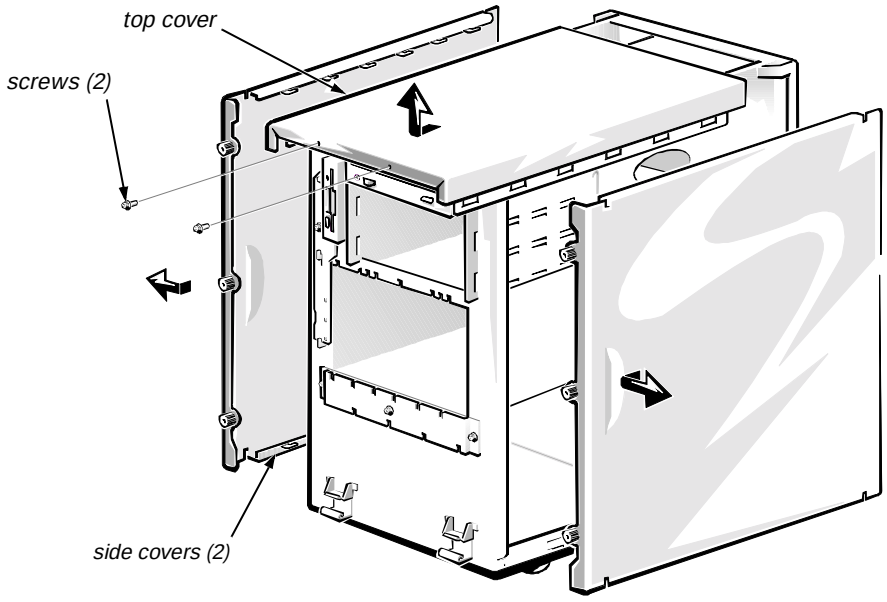



***Figure 1-11. Removing the Computer's Top Cover***

8. Replace the top cover with the top cover assembly supplied in the rack kit.

   Use the two screws that you removed in step 6 to secure the top cover provided with the kit.

9. Install the computer's side covers and front bezel.

   When installing the side covers, install the cover with the system label on the right side of the computer.

   See Chapter 7, "Checking Inside the Computer", in the *Installation and Troubleshooting Guide* for instructions on replacing the computer covers and front bezel.

10. Install the shoulder screws (see Figure 1-12).

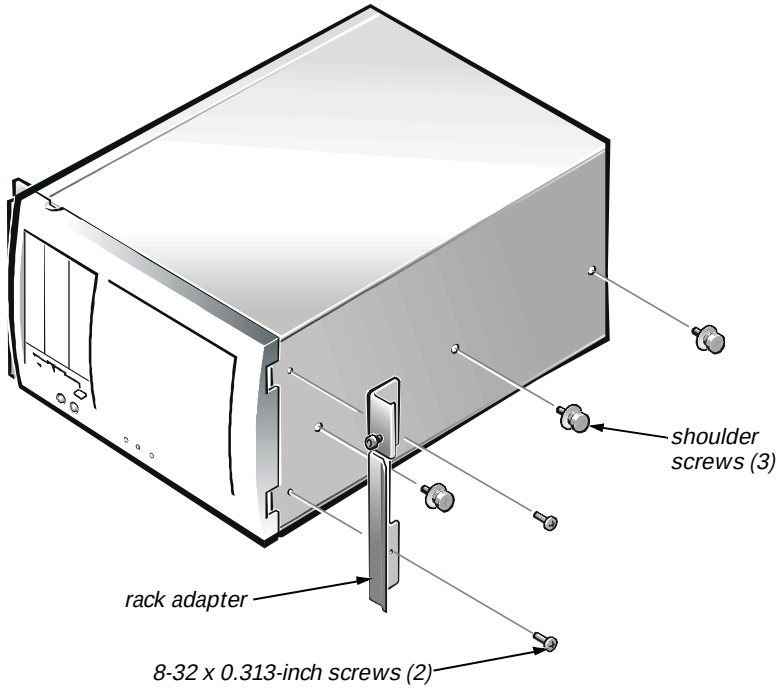



***Figure 1-12. Installing the Rack Adapter and Shoulder Screws***

11. Install the rack adapter on the computer (see Figure 1-12).

    Secure the rack adapter to the computer with two 8-32 x 0.313-inch Phillips-head screws.

## *Installing the Computer*

To install the computer in the rack, perform the following steps.

**WARNING: If you are installing more than one computer, install the first computer in the lowest available position in the rack. *Never* pull more than one component out of the rack at a time.**

1. Pull the two interior slide assemblies out of the rack until they lock in the extended position.

**CAUTION: Because of the size and weight of the computer, never attempt to install the computer in the slide assemblies by yourself.**

2. Lift the computer into position.

   Place one hand on the front-bottom side of the computer and the other hand on the back-bottom side of the computer.

3. Tilt the computer while aligning the back shoulder screws on the top and the bottom of the computer with the back rail slots on the slide assemblies.

**WARNING: Make sure that the server shoulder screws are securely engaged in the slots.**

4. Engage the back shoulder screws in the slot behind the back (green) latch first followed by the middle shoulder screw in the slot near the middle (yellow) latch. Finally, engage the front shoulder screw in the front slot.

5. Push the chassis inward until the middle (yellow) latch is engaged (see Figure 1-13).

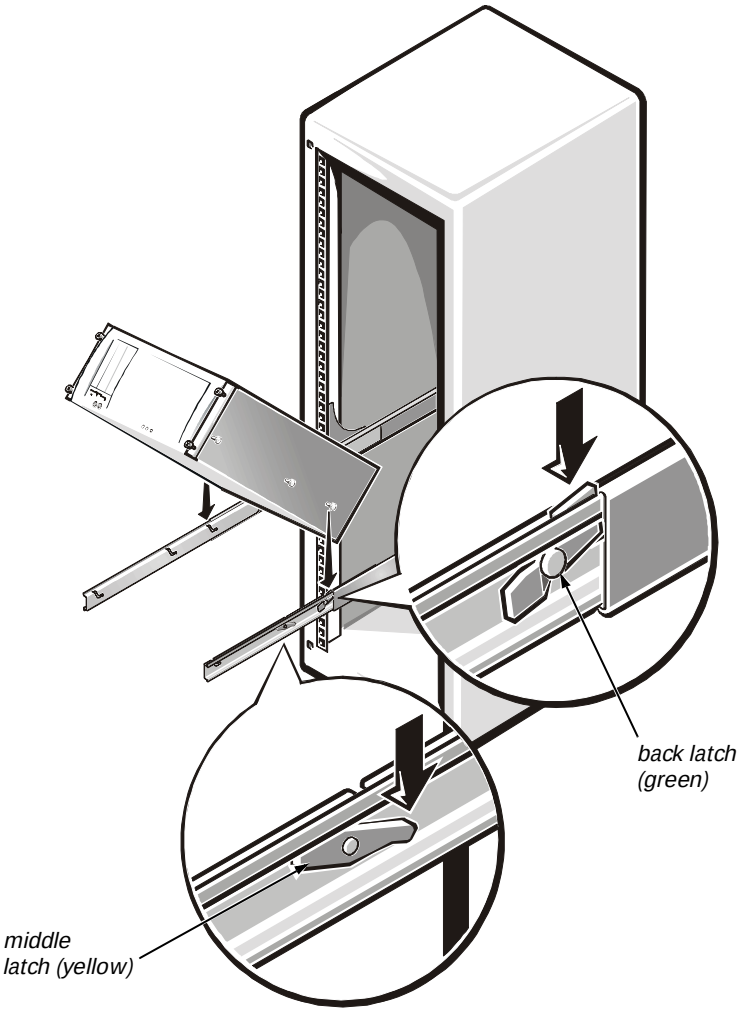



***Figure 1-13. Installing the Computer in the Rack***

6. Press up on the green latches and push the chassis into the rack.

7. Tighten the thumbscrews on each rack adapter bracket.

## Installing the Cable-Management Arm

To install the cable-management arm on the computer, perform the following steps:

1. Secure the loose end of the cable-management arm to the back vertical rail as shown in Figure 1-14.

   Use one 10-32 x 0.5-inch Phillips-head screw to secure the cable-management and template arm to the back vertical rail as shown in Figure 1-14. (This is the rail on the right as you face the back of the rack.) Ensure that the cable-management arm is straight in relation to the computer—that is, parallel to the ground.

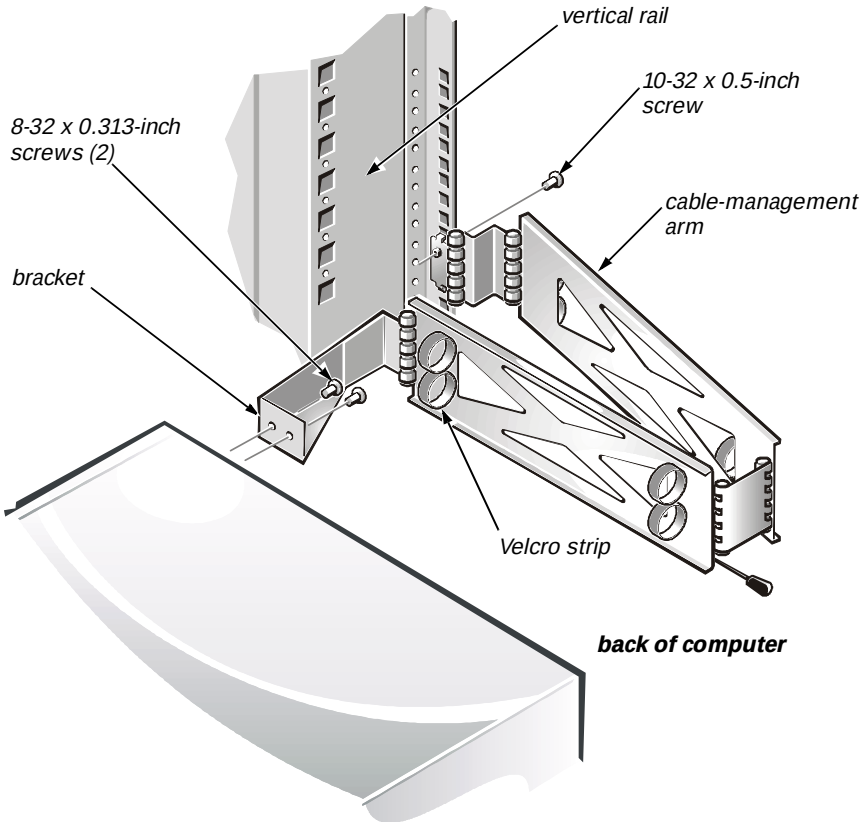



**Figure 1-14. Installing the Cable-Management Arm**

2. Align the bracket on the end of the cable-management arm with the corresponding holes on the lower-right corner of the computer's back panel (see Figure 1-14). Secure the arm using two 8-32 x 0.313-inch Phillips-head screws.

3. Connect the cables to the computer.

   For details, see your computer's *Installation and Troubleshooting Guide* and the *User's Guide*.

4. Secure the cables:

   a. After connecting the cables to the computer, unscrew the thumbscrews that secure the front rack adapter to the front vertical rail.

   b. Slide the computer forward to the fully extended position.

   c. Route the cables along the cable-management arm, and secure the cables to the cable-management arm with the Velcro strips attached to the cable-management arm.

5. Slide the computer in and out of the rack to verify that the cables are routed correctly and do not bind, stretch, or pinch with the movement of the cable-management arm.

*NOTE: As you pull the computer out to its furthest extension, the slide assemblies will lock in the extended position. To push the computer back into the rack, press the green locking latch on the side of the rail to release the locks (see Figure 1-13), and then slide the computer completely into the rack.*

## *Replacing the Rack Doors*

**CAUTION: To prevent personal injury due to the size and weight of the doors, never attempt to replace the doors by yourself.**

To replace the 42-U rack's front and back doors, perform the following steps:

1. Lift the front door into position, and align the hinges with the holes in the rack as shown in Figure 1-4.

2. Slide the hinges into the holes in the rack until the hinge release levers lock the hinges into position.

3. Verify that the hinges are latched.

4. Close the door latch by rotating the handle counterclockwise until it stops, push in the handle until it locks in position, and then slide the cover down over the push button (see Figure 1-3).

5. Repeat steps 1 through 4 to install the back door.

To replace the 24-U rack's front and back doors, perform the following steps:

1. Lift the front door into position, and align the hinges with the hinge insert in the rack as shown in Figure 1-5.
2. Slide the hinge pins into the hinge insert in the rack until the hinges lock into position.
3. Repeat steps 1 and 2 to install the back door.

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